Massive Hemoptysis in Pregnancy Due to a Solitary Pulmonary Arteriovenous Malformation

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MASSIVE HEMOPTYSIS, variably defined as 100 to 600 ml of expectorated blood in 24 hours, is a possibly fatal event[1,2] rarely reported during pregnancy.[3] We recently saw a 25-year-old woman in her seventh month of pregnancy who was found to have a solitary pulmonary arteriovenous malformation as the cause of massive hemoptysis. The presence of the lesion was suggested by a two-dimensional contrast echocardiogram.

Report of a Case

The patient, a 25-year-old gravida 1 para 0 woman at 33 weeks' gestation, was seen because of a history of recurrent hemoptysis. She said that she had coughed up between one and two cups of blood on ten occasions in the two weeks before this evaluation. She did not have fever, chills, or purulent sputum. Although there was no history of dyspnea or chronic fatigue before her pregnancy, she had recently noted substantial shortness of breath.

Her medical history was remarkable only for three episodes of bronchitis or pneumonia, which had resolved with antibiotic therapy, and one episode of blood-tinged sputum at least a year before her pregnancy. Her family history was unremarkable. After an initial evaluation by an otolaryngologist, who found no evidence of bleeding or disease in the upper airways, the patient was referred to the pulmonary clinic.

On physical examination the patient had pronounced pectus excavatum and crackles in the mid-left lung field. There were no skin or mucosal telangiectasias. Clubbing and cyanosis were absent, and the examination elicited no further abnormalities. Her chest radiograph showed dense consolidation of the lingula (Figure 1). A comparison film from 18 months earlier had been interpreted as normal. Fiberoptic bronchoscopy revealed active oozing from the lingula but no endobronchial lesions. After the procedure, the patient expectorated about 150 ml of blood, and mild hypoxemia developed. Supplemental oxygen was provided, and the hypoxemia resolved over several hours.

The patient was admitted to the labor and delivery ward for close monitoring, empiric antibiotic therapy, and further investigation. Recurrent hemoptysis over the next 24 hours resulted in an additional 150 ml of blood loss and transient hypoxemia. Her hematocrit dropped from an admission level of 0.34 to 0.26 (34% to 26%). She was given betamethasone to speed fetal lung maturation, and the induction of labor was planned after amniocentesis. Concern about fetal radiation exposure led to a consideration of various noninvasive, low-risk diagnostic tests, including a shunt study and contrast echocardiography to screen for vascular malformations. Her shunt fraction (a measure of blood bypassing pulmonary alveolar capillary units), calculated while breathing 100% oxygen, was elevated at 13% (normal 5%). An echocardiogram with bubble contrast demonstrated the delayed appearance of microcavitations consistent with an extracardiac right-to-left shunt.

The patient had two additional but less substantial (<100 ml) episodes of hemoptysis before delivery. Labor was successfully induced at 35 weeks, and a healthy baby was delivered vaginally. The following day the patient underwent pulmonary arteriography. A pulmonary arterio-venous malformation measuring 1 cm was found in the lingula (Figure 2) and was successfully embolized with steel coils (Figure 3). A chest computed tomographic (CT) examination was done to search for additional vascular lesions, but none were found. Contrast echocardiography was repeated, but showed no evidence of shunt. Nine months later the patient had had no further hemoptysis. Her chest radiograph was normal except for the presence of the wire coils and pectus excavatum.

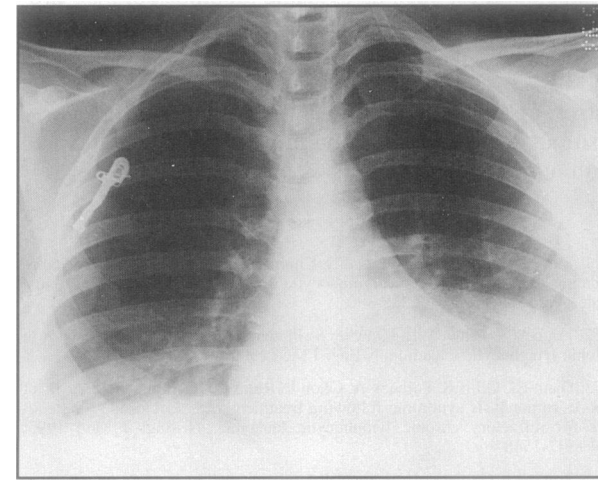

Figure 1.—An anteroposterior chest radiograph at the time of admission shows obliteration of the left side of the heart border due to lingular consolidation.

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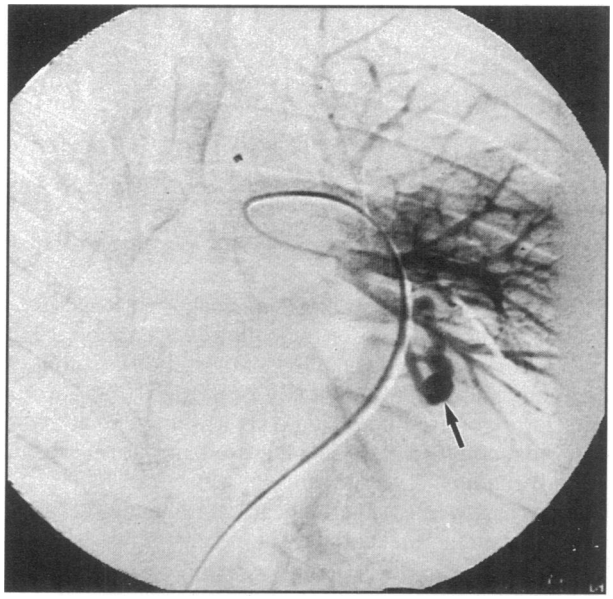

Figure 2.—Digital subtraction angiography shows arteriovenous malformation in the left lung, which corresponds to the site of bleeding identified bronchoscopically and on chest radiograph.

Discussion

Although many patients with pulmonary arteriovenous malformation are asymptomatic, life-threatening complications have been well documented, including hypoxemia, hemothorax, brain abscess, stroke, and hemoptysis.[4,5] Hemoptysis was reported to occur in 6 (10%) of 63 patients with pulmonary arteriovenous malformation in one series[6] and in 10 (13%) of 76 in another series.[7] The cardiovascular effects of pregnancy, including an increase in blood volume and cardiac output[8] and hormonally related vascular changes,[9] may adversely affect vascular malformations. Previously reported complications of the disorder in pregnancy include hemothorax in four patients[10-12] and worsening hypoxemia due to shunt in one.[13] Our report, however, is the first to describe hemoptysis due to a pulmonary arteriovenous malformation in pregnancy. In addition, our patient had no historical or physical evidence of hereditary telangiectasia, which is said to increase the incidence of complications associated with this disorder.[14] In fact, four of the six previously reported pregnant women with this disorder had hereditary telangiectasia,[10,11,13] and no details were given in the other two cases.[12]

The evaluation of massive hemoptysis focuses first on promptly identifying the site of bleeding.[1] In our patient, the bleeding site was located in the lingula at bronchoscopy. Chest CT and angiography, beginning with the bronchial circulation (the source of most hemoptysis), are often necessary to establish a precise diagnosis. These procedures may be associated with substantial radiation exposure to the fetus of a pregnant patient, however. Magnetic resonance imaging has been successfully used in the diagnosis of pulmonary arteriovenous malformations[15] and was done on our patient. Unfortunately, the location of the lesion near central vessels as well as cardiac motion artifact probably contributed to a nondiagnostic study.

Two-dimensional echocardiography with the administration of a saline solution has been reported to be extremely valuable in detecting pulmonary arteriovenous malformations.[16] This technique involves the rapid intravenous administration of an agitated saline solution while directly visualizing the right and left heart chambers. The appearance of microbubbles in the left atrium confirms a right-to-left shunt. When bubbles are detected in the left atrium within three cardiac cycles of their appearance in the right side of the heart, a septal defect is suggested. Delayed appearance, as occurred in our patient, provides evidence for an extracardiac shunt. A pulmonary arteriovenous malformation was subsequently confirmed by selective angiography of the pulmonary circulation. This approach kept the radiation exposure to our pregnant patient to a minimum.

The optimal management of a patient with massive hemoptysis depends on the patient's underlying condition, the cause of the hemoptysis, and the available expertise. Bed rest, a regimen of broad-spectrum antibiotics, and the judicious use of cough suppressants are often recommended as general measures. Positioning the patient with the bleeding side down to protect the uninvolved lung is also advocated. This may present a problem in a pregnant patient, whose venous return may be compromised by the gravid uterus in the right lateral decubitus and supine positions.[17] Endoscopic placement of a

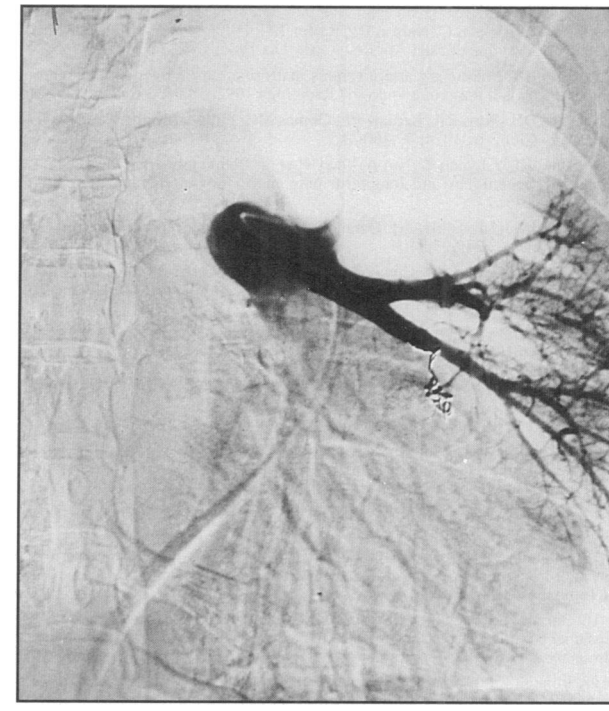

Figure 3.—A postembolization angiogram shows steel coils. Flow through the arteriovenous malformation has completely stopped.

Fogarty catheter and ice saline lavage may also be useful in patients with persistent bleeding.[1]

Fortunately, most episodes of hemoptysis can be controlled with conservative management, and definitive therapy can be delayed.[18] Whereas some think that surgical resection is still the treatment of choice for most if not all anatomically circumscribed lesions,[1,2] embolization therapy using either detachable balloons[7] or steel coils[19] has been advocated by others. Embolization therapy is obviously a less invasive procedure than thoracotomy and has a high success rate in terminating active hemoptysis. The potential for recurrence, however, remains controversial. Embolization has been successfully performed during pregnancy[11] and should be strongly considered at the time of angiography.

In conclusion, pulmonary arteriovenous malformations should be considered in the differential diagnosis of hemoptysis during pregnancy. Two-dimensional echocardiography with bubble contrast is a sensitive means of detecting the disorder and is without any known risk to a pregnant woman or fetus. Pulmonary angiography can be used to confirm the findings, and embolization can then be used as definitive treatment either immediately in life-threatening cases of hemoptysis or following delivery if the patient becomes stable with conservative treatment.

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Electrocardiographic Changes Associated With Anaphylaxis in a Patient With Normal Coronary Arteries

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CLINICIANS HAVE DOCUMENTED the occurrence and have postulated mechanisms for ischemic electrocardiographic (ECG) changes during anaphylactic reactions. Coronary angiography has shown that ECG changes do not invariably correspond to underlying coronary artery abnormalities. We report the case of an older woman who, during an initially undiagnosed anaphylactic reaction, had ECG changes suggesting acute myocardial ischemia. Angiography showed normal coronary artery anatomy.

Report of a Case

A 65-year-old woman was brought to the emergency department by paramedics after she suddenly collapsed while walking down the street. When paramedics arrived, she was diaphoretic and pale; her blood pressure was 80 mm of mercury systolic, her pulse rate was 80 beats per minute, and respirations were 20 per minute. En route to the hospital, her serum glucose level was 120 mg per dl (6.7 mmol per liter).

On arrival, the patient was nonresponsive, with no spontaneous eye opening. She remained diaphoretic and pale. Her temperature was 35°C, her blood pressure was 60 mm of mercury by palpation, and her pulse rate was 126 and regular. There was no evidence of trauma to the head. Both pupils were 4 mm and reactive to light. Respirations were shallow, and no wheezing, rales, or rhonchi were heard. Examination of her heart revealed no murmur or gallop. There was no edema or cyanosis of the extremities. Femoral and carotid pulses were palpable, although radial and dorsalis pedis pulses could not be felt. Her skin was without rash or lesions. Corneal and gag reflexes were present. The Babinski response was down-going bilaterally, and the patient withdrew all four extremities to pain. She would not answer questions and did not vocalize with painful stimuli. Her rectal tone was normal. Stool was negative for occult blood.

By phone, the patient's daughter and husband reported that the patient had appeared well when she left home earlier that day. They reported a history of hypercholesterolemia and hypothyroidism. Current medications included conjugated estrogens, medroxyprogesterone

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